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Trephining for the Cure of Epilepsy.

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CHARLESTON, SOUTH CAROLINA.

Read before the Medical Association of the State of Alabama, April, 1892, and ordered for publication.

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94
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In response to the polite invitation, received from your presiding officer and other members of this association, to participate in the exercises of this session, I must express my indebtedness for the privilege it affords me of sharing in any way in the deliberations of my distinguished professional brethren of the Alabama Medical Association.

In these days of venturesome exploits into fields of surgery, that for boldness and decision justly merit the French appellation of *la haute chirurgie*, no greater intrepidity is displayed perhaps than when we propose to invade the very domain of thought itself, and trespass upon her territories in search of disease. That misgivings concerning the legitimacy of such encroachments have trammeled some, is plainly evinced in the variance of opinion as to the value of the operation of trephining for the cure of epilepsy.

Some maintain that at best this dangerous procedure proves but palliative, since innumerable instances declare that even a year after the operation, the epileptic seizures do often still continue; and that even when a supposed cure has resulted the trephine may have revealed no marked organic cerebral lesion. The consensus among many prominent surgeons, on the other hand, is that trephining is not only curative, but a

most important prophylactic measure of axiomatic significance in all cases of depression of bone with symptoms of compression after cranial injuries.

Now this conflict of opinion I would wish to interpret by however brief an examination of the reasons influencing such opposite statements respecting the results of a surgical procedure recurring almost daily at our hospital clinics. The exposition of the subject from this standpoint constitutes the principal object of the present communication.

Distrust in the trepan has undoubtedly arisen in part because of the prurient haste with which many have heralded their cures pending a few weeks or months after operating. These instances have often, indeed most generally, led to the inference that patients were apparently relieved but not cured, as the recurrence of convulsions for sometime after the operation seemed so frequently to prove.

It is just here that we must recall the inherent property of the cells of the cerebral cortex to manifest the phenomenon of automatism under the slightest stimulation and often spontaneously from no apparent excitation at all. This is an important biological condition of the cortex. It explains how contractions of an epileptiform convulsive nature, may for a while persistently recur, even though the primary cause that obviously initiated the true epileptic paroxysms—such as a piece of depressed bone, a tumor, or an abscess—has been wholly removed. Manifestations which at first depended upon the advent of afferent impressions may afterwards continue irregularly to emanate almost spontaneously from cortical centres which have been excited to super-eminent activity through long-continued, frequently repeated vehement impressions, from some eccentric source. Through intercortical connections more than one centre may participate in radiating these efferent impulses far beyond the special motor area primordially involved; while the primitive diseased focus itself continues to accumulate a biotic cell force that is irregularly but often paroxysmally dissipated. This increment of energy doubtless depends upon the very metabolic tissue-changes that have

occurred through hypernutritive processes in the nervous substance or nerve protoplasm; changes that are all sufficient and indeed are quite prone to keep up for a period these autocratic explosions. But let us for a moment suppose these automatic centres separated or cut adrift from all afferent impulses, then, the usual sources of normal stimulation being removed, all excito-reflex expressions will wane away into undulations slowly decreasing in frequency and vehemence, until, coming gradually to a standstill they wholly disappear. To speak in common parlance, such local centres surcharged with nerve energy acquire a constitutional habit of discharging their force, which habit slowly subsides then finally wears away. Now from this physiological view of the spontaneous intrinsic life-history of the brain I feel prepared to maintain, that, where no disorganization of the cortex has yet taken place, surgical interference at the seat of injury with the trephine, elevator, or rongeur forceps, must assuredly cure the patient since we shall have released the cortex from all direct or threatening sources of irritation. Let not the recurrence of convulsive attacks particularly disconcert us; even should these epiphenomena consequent upon the inherent nature of a disturbed nervous system continue to repeat themselves for a season, nay even for a year, diminishing in intensity, experience has more than once shown that we may often look forward to a cure; but more frequently still to amelioration of symptoms in the nature of the paroxysms. Of course it is understood that such attacks making their appearance immediately after head-injuries and persisting with increasing violence consorted with mental decadence should admonish us that organic disturbance is taking place, unless some neurotic taint is disclosed. I believe that if the record of cases of trephining for the cure of epilepsy were invariably postponed until time rectified our misconceptions respecting them, we should realize more frequently the accuracy of this asseveration.

It has again been affirmed, that with disclosure of no trace of disease beyond a scar or bit of sclerosed bone, the cure

ascribed to trephining would just as well have resulted from carefully conducted general treatment and restoration of health; that the operation in such an instance was unjustifiable perhaps as the case might have been one of hystero-epilepsy. Apart from considering accuracy of diagnosis, without which no one is properly appointed to constitute himself the surgeon in difficult or doubtful contingencies such as are here implied, we must be reminded that experimental irritation of the dura and other meninges are known to produce wide-spread convulsions in the hands of vivsectionists. Such experiments show how peripheral excitations frequently bring about epilepsy of a reflex character. Epileptogenous zones are brought into activity from distant eccentric points, but more particularly from immediate cranial nerve implications, as when a scar or cicatrix involves branches of the trigeminus in direct distribu tion to the dura, pia, or other structures about the brain. It often happens that traumatic epilepsy is induced by a wound of the scalp alone, so entangling and compromitting peripheral nerves in the cicatrix that these compressed nerve filaments become the source of painful irritation. So simple, so peripheral a source has not evidently been recognized by everyone. There are many who will perhaps consider these views as unwarrantable. But, that there is no introduction of subjective fancy or error here has been demonstrated by direct experiment. A nerve-trunk may not have the power of evoking spasms or convulsions, whereas its own cutaneous filaments, under certain conditions may readily possess and present this power. A specially affected or diseased centripetal nerve may absolutely originate an epileptic aura which reaching its centre explodes into a veritable epileptic seizure of apparently idiopathic origin. This I have often seen. Cut away this communication from the centre, and then the pathological condition with its consecution of accompanying events soon disappears.

Such a source of epilepsy exists far more frequently, I verily believe, than is generally imagined. It has been often seen by the prominent in the profession, who, nevertheless, have

failed completely to understand it. But a few years ago at the Clinical Society of London (Dec. 6, 1879), M. Bryant wondered whether so dangerous an operation as trephining was always justifiable; might not less severe measures be resorted to. He cited three instances in which he could attribute the cure to his having simply incised down to the bone, for he did not trephine, because there was no cranial fracture, yet, the patient was relieved and subsequently had no more fits. Dr. West, in reply, remarked that he could not see on what principle simple incisions into the scalp could operate in relieving the patient. Fracture of the skull without depression may become markedly sclerosed at the point of repair, may affect adhesions to the scalp or dura or both, which adhesions in their turn disturb intracranial circulation to an extent all sufficient to produce changes in the metabolism of the brain cells, and the consequent perverted nutritive processes that ensue sooner or later result in convulsive twitchings of parts under the control of the immediate centres implicated. We can readily understand, therefore, how severance of such compromitted structures relieves them at once, removes all distress, and thus cures this disease, even when no lesion of the brain itself has been disclosed by the trephine. These are the cases in which no disorganization of the cortex visible to the naked eye have ended in recovery.

It is also argued that frequently during the progress of trephining nothing has been discovered in the track of the wound, nor on the surface of the brain—the epilepsy remains unrelieved—the operation proves a failure.

From progressively advancing knowledge of the pathogeny of epilepsy, derived from work done in our modern histological laboratories, I am assuredly more and more impressed with the belief, that epilepsy will in the near future be recognized to depend upon a morbid change occurring in the gray substance of the convolutions, perhaps even in the subcortical tubular substance of the brain; induced not alone by direct traumatism, nor again by any trace of a previous polioencephalitis; but brought about by molecular alterations depend-

ent upon some defective equilibrium in the blood pressure throughout the capillary work-shop of the part. Whatever may have been said to the contrary by those who have not resorted to the microscope, I am satisfied that a disturbed circulation within the conditional limitations of local foci takes place to a notable degree, which is the first step towards a preternatural exaltation of function in the cortex, as has already been intimated; this capillary disturbance extends apparently to distant parts, for Perigand detects changes in the retinal circulation with marked contraction of the visual field, and we all know that a bilateral or unilateral optic neuritis has not unfreqently been encountered. Now, the ultimate consequence of such vascular disturbance is tissue change, the molecular expressions of which are alone discoverable by the microscope. Recent rssearches upon this subject have detected a marked increase of the scaffold support of the nerve cells—the neuroglia—as Virchow terms it; not simply an hypertrophy, but a veritable hyperplastic augmentation of the connective tissue, with spider-cell prolongations of the neuroglia encroaching upon the cortex cells crowding them out, producing gradually a complete atrophy of these important elements, so that they are scarcely discernible in the condensed mass of neurogliar sclerosis that ensues. Here then the gradual development of this granular, fibrillated, and adscititious texture invades one or more motor areas until, progressing to its furthermost extent ends in the production of nodules over the surface of the convolutions perceptible to touch and sight; adding such density to the encephalon that the brains of epileptics have not infrequently been found of greater weight than those of healthy persons of the same age and size. Until this advanced condition obtains the brain shows no evident alteration of structure, disclosing the cerebral surface, simple inspection exhibits no pathological change, no trace of meningitis, no tumor, no abscess, no dural adhesions, no laceration. This interstitial alteration—this secondary sclerosis—be it remembered is of slow development, occurring somewhile after the initial cause has inaugurated it, which accounts for the almost inva-

riable delay of the epileptic seizures after cranial lesions. Coming down upon the brain-bark, the surgeon should be specially mindful of his pathology, and not infer that there exists no disease because he finds no disseminated patches of induration; for there also obtains another form of degenerative neuroglia, of a soft and gray nature, characteristic of a gliomatous condition, becoming sometimes caseous. These degenerescences should be sought for and removed, just as we would a sarcoma, syphilitic gumma, fibroma, or any other morbid product. By a better appreciation of this morbid anatomy, and of the normal anatomy of cerebral localizations, we are beginning to designate conditions anticipative of focal lesion and disease. It is thus that we may regard the so-called new disease—"Laryngeal Epilepsy or Vertigo"—as one of direct cerebral origin; expressive of distress in the laryngeal cortical centre at the third frontal convolution, and from its singularly transient and curable nature indicates possibly only an incipient focal commotion, before even any hystolytic changes have commenced; a simple functional aberration in the brain-bark of the "projecting speech centre," due as I have endeavored to explain, to some temporary cerebral vascular repletion, connected with a perturbed and labored respiration. But, so soon as a more progressive alteration takes place in the cortex, we, with almost equal confidence can indicate the particular focal area implicated, and point to the leg, arm, or face centre, as in certain cases of Jacksonian epilepsy.

We are prepared then to say, that, when interfering surgically for the relief of epilepsy, we have encountered no peripheral source of trouble in any morbid condition that has confronted us, it becomes our duty, from present enlightenment on this subject, to determine if possible the brain territory that disease oppresses and to reach the *fons et origo mali* before we hasten to declare that the trephine has discovered no disease and has proved powerless to relieve.

A question aptly suggestive in this connection at once arises: whether indeed bold invasion of a diseased, or supposed diseased, province of the brain itself should constitute a

legitimate step of the operation? If we are not to stop short of the successful fulfilment which the operation proposes, I unhesitatingly reply in the affirmative; of course qualifying this answer, by an assurance that the distressed centre has been satisfactorily ascertained by the symptoms presented and by application of the electrodes with proper precautions. It is most true, that the procedure has not always been satisfactory, but it seems the rational course. Brain wounds with loss of substance heal by granulations that fill up the cavity. The reparative power of the cerebral tissue is sometimes marked. The uniformity and energy of distribution of nutritive and vascular activity in the young and growing brain, endows it with powers of repair, not always realized in the already organized and equipped brain of the adult, and still less in that which is undergoing the effects of senescence characteristic of advanced life, where the gray substance is altered in thickness and color from the granulo-fatty transformation of its nerve-cells. Yet even at any age surgeons know that the limited escape and ablation of cortical and sub-cortical portions of injured or disorganized brain substance have exhibited wonderful repair and return of function mysteriously performed by neighboring parts or vicariously by the opposite hemisphere.

To these recusant views as to the efficiency of trephining for the permanent cure of epilepsy we will formulate the following reply:

First—Avoid complacent dogmatism respecting failure of the operation because of continued paroxysms for a time after proper use of the trephine.

Second—Where epilepsy depends obviously upon a blow with scar of the scalp, or cranial fracture without depression, removal of nerve implications alone may often cure the disease.

Third—In absence of any lesion whatever in adjacent parts, search for neuroglear or gliomatous sclerosis as the focal disease and excise it.

In conclusion, I cannot forbear narrating one case only of my own as a running comment on what has herein been advanced; but especially because of the length of time it has

been under my direct observation. More than forty years ago, a lad then of fifteen years of age in Charlotte, North Carolina, was kicked by a horse over the right side of the forehead; remained unconscious several days; frontis was fractured and depressed; escape of pieces of bone kept wound open for a time. One year after cephalalgia commencing interrupted his collegiate studies, which he ultimately completed. Convulsions declared themselves later on, daily augmenting until his memory and general health became sensibly impaired. The fits in number and violence were so great, that on one occasion he fell out of bed and dislocated his shoulder joint. Came to Charleston to consult me as to an operation, and on the day of his arrival had ten convulsions within thirty-six hours. An inch and a half button of bone removed at the seat of injury presented on its cerebral surface an osteophyte an inch in length adherent to the dura, which when raised exposed a visibly large absence of brain substance involving the suprafontal, midfrontal and subfrontal gyri. Convulsions recurred the day after the operation and were repeated with singular vehemence for weeks while remaining under my care. The porencephalia that existed formed such a crater-like depression as effectually prevented any hernia of the brain during the labored respiratory efforts accompanying these attacks. The tormenting headaches and mental decadence seemed ameliorated however, and though for months after he left me, epileptic attacks hopelessly depressed my patient, he acknowledged them to be of shorter duration and less frequent, though they continued to recur for at least two years. Now this operation was performed in November, 1855, he had returned to his home, and I had lost sight of my patient, for more than eight years, when, most unexpectedly, while in the army in Virginia, we met again, and I confess my surprise was as great as my pleasure, to find him at last restored to perfect health as his appearance at once declared; serving in the ranks as a private soldier, undergoing all the privations and hardships of the tented field. Since then he has had a severe attack of typhoid fever, which was followed some years

after by erysipelas from an accidental fall. He has married twice and for one of his age enjoys uninterrupted good health. This information obtained directly from him in his country resort, also includes the statement that he has no head symptoms and no more convulsions. I have been creditably instructed as to his recent habits of intemperate indulgence notwithstanding which he still remains entirely free from the fearful disease which once embittered a life that was nearly ended.

I have intentionally omitted details of illustrative cases from my own experience and that of others, as they would have consumed time; but have rather confined myself to the brilliant possibilities of the surgery of the future, in its contest for supremacy over those disturbances of automatic activity that constitute the phenomena of acquired erethism in the autonomy of the cerebral cells.